An Impairment of Spatiotemporal Gait Adaptation in Huntington's Disease when Navigating around Obstacles

Authors : Naznine Anwar, Kim Cornish, Izelle Labuschagne, Nellie Georgiou-Karistianis

Abstract : Falls and subsequent injuries are common features in symptomatic Huntington's disease (symp-HD) individuals. As part of daily walking, navigating around obstacles may incur a greater risk of falls in symp-HD. We designed obstacle-crossing experiment to examine adaptive gait dynamics and to identify underlying spatiotemporal gait characteristics that could increase the risk of falling in symp-HD. This experiment involved navigating around one or two ground-based obstacles under two conditions (walking while navigating around one obstacle, and walking while navigating around two obstacles). A total of 32 participants were included, 16 symp-HD and 16 healthy controls with age and sex matched. We used a GAITRite electronic walkway to examine the spatiotemporal gait characteristics and inter-trail gait variability when participants walked at their preferable speed. A minimum of six trials were completed which were performed for baseline free walk and also for each and every condition during navigating around the obstacles. For analysis, we separated all walking steps into three phases as approach steps, navigating steps and recovery steps. The mean and inter-trail variability (within participant standard deviation) for each step gait variable was calculated across the six trails. We found symp-HD individuals significantly decreased their gait velocity and step length and increased step duration variability during the navigating steps and recovery steps compared with approach steps. In contrast, HC individuals showed less difference in gait velocity, step time and step length variability from baseline in both respective conditions as well as all three approaches. These findings indicate that increasing spatiotemporal gait variability may be a possible compensatory strategy that is adopted by symp-HD individuals to effectively navigate obstacles during walking. Such findings may offer benefit to clinicians in the development of strategies for HD individuals to improve functional outcomes in the home and hospital based rehabilitation program.

Keywords : Huntington's disease, gait variables, navigating around obstacle, basal ganglia dysfunction

Conference Title : ICCN 2015 : International Conference on Cognitive Neuroscience
Conference Location : Amsterdam, Netherlands
Conference Dates : August 06-07, 2015